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DIANE M. BIRNBAUMER, MD

Torrance, California

Intravenous Amiodarone for Treating Acute Life Threatening Arrhythmias

IN 1995 an intravenous formulation of amiodarone was approved by the FDA for treating refractory ventricular tachycardia and fibrillation (VT/VF). Intravenous amiodarone holds great promise for the emergency treatment of unstable VT/VF, and it may also be useful for the treatment of atrial fibrillation (AF) in unstable patients.

Intravenous amiodarone has a myriad of electrophysiologic effects, some of which differ from the oral formulation. Central among these effects is the prolongation of the action potential in all cardiac tissues (Class III), but intravenous amiodarone also blocks calcium channels (Class IV) and has β-adrenergic blocking actions (Class II). The magnitudes of the various electrophysiologic effects are dependent on both dose and duration of therapy, with Class IV and Class II effects predominant first. The significance of these electrophysiologic properties lies in amiodarone's antiarrhythmic effects on both supraventricular and ventricular arrhythmias.

The role of intravenous amiodarone in the management of unstable VT/VF is evolving. Although smiodarone does not yet apper in the American Heart Association's advanced cardiac life support treatment algorithm for VT/VF, emerging evidence suggests that VT/VF treatment is at least as effective as bretylium. A randomized double-blind study (involving 302 patients) found amiodarone to be as effective as bretylium, with a significantly lower incidence of hypotension in the amiodarone group (19% versus 32%). Another randomized trial, involving 504 patients in cardiac arrest from sustained VT/VF, showed that administering amiodarone in a prehospital setting was associated with a significant improvement in survival with emergency department admission compared to standard therapy. Additional small nonblinded case series suggest that amiodarone is more effective than lidocaine or procainamide as first- or second-line therapy for VT. Taken as a whole, these data support the replacement of bretylium by amiodarone as third-line therapy after defibrillation and lidocaine for unstable VT/VF and, if confirmed by further studies, perhaps establish a role for amiodarone as the primary antiarrhythmic medication.

Intravenous amiodarone has also been studied in unstable patients with atrial fibrillation. The treatment of these patients represents a difficult therapeutic challenge. Current therapies including pharmacologic or electrical cardioversion and rate control with digoxin or calcium channel blockers may be ineffective or relatively contraindicated. Small studies have suggested amiodarone is a reasonable alternative in these patients. In one study, nine critically ill patients with atrial fibrillation and ejection fractions less than 15% received intravenous amiodarone. Eight of these patients converted, and all showed ventricular rate control. Another study randomized a heterogeneous group of 42 stable and unstable patients with supraventricular tachycardias to receive intravenous amiodarone or magnesium. Of these, 36 (86%) had irregular atrial tachycardias—predominantly atrial fibrillation or flutter. Amiodarone and magnesium were equally effective for rate control; patients in the magnesium group, however, were more likely to return to sinus rhythm. Although available data do not allow conclusive recommendations for the management of atrial fibrillation in unstable patients, amiodarone is a reasonable consideration.

The side effect profile of IV amiodarone is comparable to that of other antiarrhythmics. Hypotension is the most common significant adverse reaction. Principally due to vasodilation, hypotension generally responds well to intravenous fluids or low dose dopamine. Amiodarone's β-adrenergic blocking effects can result in bradyarrhythmias, which are treated in the usual manner but may ultimately lead to the discontinuation of the drug.

Intravenous amiodarone is expensive. The pharmacy cost of a 150 mg vial exceeds $55; and the cost of a one-day infusion is about $400. Current evidence suggests that IV amiodarone is *clinically* effective for life-threatening VT/VF and *possibly* effective for patients with unstable atrial fibrillation. Whether amiodarone is a *cost*-effective solution for patients with these serious arrhythmias remains to be determined.

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SCOTT R. VOTEY, MD

MEL E. HERBERT, MD

Torrance, California

Emergency Department Management of Falls in the Elderly

THE US population is growing older, and the most rapid growth is among the oldest of the old. Falls are a substantial problem in older persons, occurring in approximately one-third of those 65 years and older.

Falls directly or indirectly cause 12% of all deaths in older persons. Approximately 5% of these falls result in fracture; another 5% to 10% result in serious injuries that require medical care. Over two-thirds of those who fall will fall again in the following six months. For patients who are hospitalized, the risk of death in the year following hospitalization ranges from 15% to 50%.

If future falls and more significant injuries are to be prevented, identifying their causes is as important as identifying and treating the consequent injuries. Underlying causes of falls include the functional decline associated with aging (weakness, poor balance, and vision problems); environmental factors (poor lighting, uneven or slippery surfaces, loose rugs, or steep steps; and acute and chronic medical problems.

The majority of older patients who have fallen report that they did so after tripping. Physicians should consider whether a younger person would have fallen in similar circumstances. The patient or other historian should be asked about the number of falls in the past three months and whether the patient was able to get up unassisted or in fewer than five minutes after their fall. Patients who are not able to get up without assistance are more likely to experience a decline in independent living status, be hospitalized, or suffer early death.

As many as 25% of Americans age 65 or older receive at least one of 20 medications considered to be relatively contraindicated in older persons; approximately 5% are taking two or more of these drugs. Medications contribute to falls by causing drowsiness, poor balance, and postural hypotension. A patient who has fallen should be asked which medications are new and if there have been any recent changes (including dosage) in their medications. Medications not appropriate for older patients should be discontinued and an alternative drug substituted when necessary. For example, zolpidem (Ambien) should be substituted for all long-acting benzodiazepines. Another option is to reduce the dosages of other drugs—for example, diuretics—if orthostatic hypotension is present. All older patients who have had more than two falls in three months and are taking more than four prescription medications should be referred to their primary care physician to check their medications.

A systems review should include examining those characteristics likely to be associated with causes of falls in the elderly: shortness of breath, chest pain, nausea, vomiting, diarrhea (volume depletion), dizziness, melena, weakness, diaphoresis, and so on. Loss of consciousness and seizures should be considered in all patients, and an independent observer should be questioned about these possibilities. Abnormal vital signs may suggest occult infection or cardiac or pulmonary disease. The threshold for ordering orthostatic vital signs should be very low. Pulse oximetry is encouraged as a fifth vital sign.

Altered mental status may be a cause or a consequence of a fall. A minimal evaluation of mental status involves asking the patient to state the present month and year. Evaluating a patient's mental status involves determining if there is a change from baseline, and it often requires verification with a family member or the patient's physician. Delirium may go unrecognized in older patients who present to the emergency department with a variety of medical complaints—including falls. It is estimated that 10% of emergency department patients over age 65 meet the criteria for delirium and less than 25% of those patients are recognized. Common causes of delirium are medications, infection, and cardiopulmonary disease.

Injury is often the reason for the emergency department visit after a fall. Obvious injuries include fractures of the hip and distal radius. Occult injuries include subdural hematoma, spinal compression fractures, rib fractures, and pubic rami fractures. The physical examination therefore needs to include an examination of the head, spine, pelvis, and extremities. In patients with multiple old and new injuries, elder abuse should be considered.

Perhaps the single best physical assessment of older emergency department patients (and one not done with most patients) is evaluating the patient's ability to get up from the gurney and walk. This test essentially excludes the presence of significant lower extremity, pelvic, or spinal injury and is an adequate gross examination of strength and balance. Fifteen percent of people older than 60 have some disorder of gait due to one or more of many factors, including Parkinson's Disease, hemiparesis, diminished proprioception, cervical spondylosis, low pressure hydrocephalus, and so on. Diagnostic imaging (hip films, computed tomography of the brain) is often necessary to rule out injury caused by the fall. Selected laboratory studies should be considered to rule out acute or subacute medical conditions that may have caused the fall—such as electrolyte abnormalities, occult gastrointestinal bleeding, occult infection (discovered by urinalysis or chest radiograph), and cardiopulmonary disease (detected by electrocardiogram or serum troponin testing).

Social services support is available in many emergency departments. This type of support should be used more frequently for older patients—they often live alone or with a dependent spouse or significant other, they have limited financial resources, and they have limited mobility. Indications for social service consultation include the need for a change in living arrangements; the need for nutritional support; suspected elder abuse: and complex social or family problems.

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LARRY J. BARAFF, MD

Los Angeles, California

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